

KELSEY (C.B.)

*Compliments of*

CHAS. KELSEY, M. D.  
48. E. 30TH ST.

# EXTERNAL RECTOTOMY

AS A

## SUBSTITUTE FOR LUMBAR COLOTOMY

IN THE

TREATMENT OF STRICTURE OF THE RECTUM.

BY

CHARLES B. KELSEY, M. D.,

SURGEON FOR DISEASES OF THE RECTUM TO THE EAST SIDE INFIRMARY, NEW YORK.

[REPRINTED FROM THE NEW YORK MEDICAL JOURNAL, MARCH, 1890.]



NEW YORK:

D. APPLETON & COMPANY,

1, 3, & 5 BOND STREET.

1880.



## EXTERNAL RECTOTOMY AS A SUBSTITUTE FOR LUMBAR COLOTOMY IN THE TREATMENT OF STRICTURE OF THE RECTUM.

---

ABOUT two years ago, having under my care a woman suffering from constitutional syphilis, and from an old stricture of the rectum which had resisted previous treatment by bougies, I was induced to try the operation of internal rectotomy. The contraction was so great as barely to admit the passage of the end of the finger, and above it there was a large ulceration. Under ether, the sphincter was stretched and the stricture divided posteriorly by a single deep incision, which certainly divided all of the cicatricial tissue and reached nearly to the sacrum. The patient recovered nicely from the immediate effects of the operation, and after a few days water-bags and soft bougies were employed to prevent recontraction. These caused much irritation and suffering, the rectum became very tender, and all further interference was prevented by an attack of pelvic cellulitis which nearly cost the patient her life. I have always considered this complication a result rather of the attempts at dilatation than of the incision itself; but be that as it may, the woman expressed herself as unwilling to submit to any further treatment, and after a few months passed out of observation not materially relieved. Since that time I have been surprised at reading in Mollière\* the following sentence: "We are right, then, to-day in considering linear rectotomy as the best method known up to

\* "Maladies du rectum et de l'anús," p. 339.



the present time for curing grave contractions of the rectum, or at least of palliating the symptoms to which they give rise."

The word rectotomy, as at present used, means little more than would the analogous word urethrotomy without some qualifying adjective. The French writers describe an internal, an external, and a linear rectotomy, which they distinguish from each other; and, to avoid ambiguity in the description of cases, it may be as well for us to adopt the names used by Mollière, in whose work no fewer than six different procedures are grouped under this title: 1. Nicking the stricture at one or more points, to be followed by subsequent dilatation. 2. Excising a portion of the cicatricial tissue. 3. Crushing a portion by an instrument similar to the enterotome of Dupuytren. 4. *Internal rectotomy*, or free incision in the median line, either anterior or posterior, of the whole of the cicatricial tissue, but not of the sphincter. 5. *External rectotomy with the knife*; or division not only of the stricture, but of all the parts below, including the anus. This is the operation usually accredited to Nélaton, and is thus described by Panas: "The patient being in position on the side, the left index-finger is introduced as far as the stricture, and acts as a guide for a blunt bistoury introduced flatwise and turned with the edge backward so as to divide all the soft parts as nearly as possible in the median line. The incision thus made grows deeper as it approaches the skin, forming a large funnel-shaped canal, the apex of which corresponds to the stricture now rendered visible especially by making traction downward and outward on the lips of the wound. Nothing is easier than to introduce then a bistoury through the stricture, which is incised posteriorly sufficiently to pass a catheter two centimetres in diameter, which is left in as long as possible." 6. *External rectotomy with the écraseur or the galvano-cautery* (linear rectotomy of Verneuil). We give Verneuil's own description. "The left index-finger is introduced into the rectum with the first phalanx flexed at a right angle, passing through and hooking into the stricture. A trocar is then plunged through the skin at about two centimetres from the tip of the coccyx in the median line, and forced through the rectum on

to the pulp of the finger a few centimetres above the stricture. After drawing out the trocar, a fine bougie is passed through the cannula into the rectum, and brought out at the anus. Removing the cannula, the bougie is replaced by the chain of the *écraseur*, and the operation is completed exactly as in the case of an ordinary fistula." When there are fistulous tracts already existing and opening into the gut above the stricture, one of these may be used for the passage of the chain.

For the purpose of this article we shall consider only the last three of these operations, which are the ones especially adapted to severe cases, and by all of which the stricture is completely divided—two dividing the sphincter muscle and the anus as well. By searching through the journals of the past few years, I have succeeded in tabulating the following cases of these operations, which have been condensed for purposes of comparison. Many of them unfortunately are briefly reported, and others, not given here, I have omitted, finding it impossible to tell exactly what operation was performed or what were its results. In all of those reported below the disease was so severe as to render the milder methods of treatment of no avail, and in all in which the contrary is not expressly stated, it was so near the anus as to bring the stricture below the reflection of the peritonæum.

#### INTERNAL RECTOTOMY.

1. WHITEHEAD.—Old fibrous stricture: anterior and posterior incision with bistoury, followed by dilatation. Two months later, much improved; passages large and natural; dilatation continued.—“*Amer. Jour. Med. Sc.*,” Jan., 1871.

2. LENTE.—Fibrous stricture and fistula: incision followed by dilatation. Three months later, much relieved, with prospect of entire cure by continuing the use of bougies.—“*Amer. Jour. Med. Sc.*,” July, 1873.

3. BEANE.—Probably syphilitic: incision both anterior and posterior, followed by use of dilators. Seven months after, cure of ulceration and of many bad symptoms, but tendency to recontraction.—“*Amer. Jour. Med. Sc.*,” Apr., 1878.

#### EXTERNAL RECTOTOMY WITH THE KNIFE.

1. PANAS.—Female, aged 33. Syphilitic stricture, very dense and painful; eight years' duration. Incontinence for three months after operation. Eighteen months later, described as completely cured.—“*Gaz. des Hôp.*,” Dec., 1872.



2. WHITTLE.—Hard annular stricture, very close: one fistula. Operation as for ordinary fistula. Hæmorrhage troublesome and controlled by thermo-cautery. Three weeks later, "general health completely restored and local condition greatly relieved."—"Lancet," June 1, 1878.

3. PANAS.—Woman, age 40. Stricture probably syphilitic. Two previous operations by slight internal incision, and two attempts at cure by dilatation. Patient very feeble; suffering from abdominal distention; signs of approaching occlusion; ovarian tumor; diarrhœa and vomiting. Operation followed by relief of pain and by great comfort; no tendency to return; vomiting and diarrhœa continued till death, some time after, from exhaustion. Post-mortem examination showed the complete success of the operation, and the division in the fibrous tissue.—"Gaz. des Hôp.," Dec., 1872.

EXTERNAL RECTOTOMY WITH THE ÉCRASEUR, GALVANO-CAUTERY, OR THERMO-CAUTERY.

1. TRÉLAT.—Ano-rectal syphiloma, of several years' duration, with great thickening, ulceration, and fistulæ. Operation (kind not stated) five years before, unsuccessful. Galvano-cautery. Nine days after operation, pneumonia and facial erysipelas. Death in three weeks without local accident.—"Prog. Méd.," June 22, 1878.

2. VERNEUIL.—Stricture of several years' duration; great induration and tumefaction, and twenty fistulous tracts. Three operations; first, on one half the fistulæ; second, on remainder; and third, on the stricture with écraseur. Four months later, "wound healed and functions of the rectum entirely reestablished."—"Gaz. des Hôp.," 1872, p. 1028.

3. VERNEUIL.—Previous syphilis; great constitutional disturbance; scrotum enlarged to three times its natural size by fistulous tracts, of which there were twelve. Écraseur through one of the fistulæ—others operated on a month later. Two years later, parts had regained their suppleness and all traces of disease had disappeared.—*Loc. cit.*

4. VERNEUIL.—Patient in bad general condition. Two operations with écraseur at six weeks' interval. First, posterior rectotomy with division of posterior fistulæ; second, anterior rectotomy with division of anterior fistulæ. Incontinence lasted only a few days. There was marked tendency to recontraction, due to the fact that the stricture was so extensive that the chain was not carried to its upper limit, and a distinct zone of cicatricial tissue was left.—*Loc. cit.*

5. VERNEUIL.—Woman, reduced to last degree of marasmus, with hectic. Stricture complicated with much ulceration above and below, and three or four fistulæ. Operation followed by great relief of all symptoms. After several years, again examined: general condition still good, but a very appreciable recontraction of a year's duration.—*Loc. cit.*

6. VERNEUIL.—Stricture very close and hard; previous dilatation without effect. Phlegmon existing on one side, and old fistula on the other. Abscess laid open and chain passed through it into gut above stricture.

Four years later, died of phthisis, having been entirely free from symptoms in mean time. Before death, stricture admitted two fingers easily.—*Loc. cit.*

7. VERNEUIL.—Constriction very hard and close; also fistula. It was found almost impossible to pass trocar beyond the contraction on account of its great hardness, and this was finally accomplished only by boring a tract with a pair of curved scissors. The *écraseur* required three quarters of an hour to cut through. Several months later, general state very satisfactory; rectal wall had partly regained its suppleness; no difficulty in defecation, but a still appreciable contraction, due to the fibers which were too high up for the chain.—*Loc. cit.*

8. VERNEUIL.—Previous syphilis. General condition bad. Stricture consisted of a limited contraction of the posterior and upper fibers of the sphincter, and disappeared on prolonged pressure with the finger. Two previous operations, one by internal incision, the other by nicking and dilatation. Division by trocar and *écraseur*; incontinence for a few days; after three weeks, passages natural and all symptoms relieved. Three years after, again examined, and found suffering from rectal syphiloma developed since operation, together with tertiary eruptions.—*Loc. cit.* [History completed by Tison in "Thèse de Paris."]

9. VERNEUIL.—Previous syphilis; stricture annular; much constitutional disturbance, great pain, diarrhœa, colic, and discharge of pus. Operation of *internal* rectotomy with thermo-cautery, followed by phlegmon. Abscess opened and external operation done with thermo-cautery through abscess cavity. One month later, relief of all symptoms; return of suppleness in parts; stricture admitted two fingers easily; tendency to recontraction in posterior part of rectum; anterior part healthy.—Tison, "Thèse de Paris."

10. VERNEUIL.—Rectal syphiloma; anæmia and loss of flesh; great tenesmus. Thermo-cautery. Incontinence for three weeks. Reported completely cured after three months.—Tison.

11. VERNEUIL.—Stricture probably inflammatory, with several fistulæ. Thermo-cautery. Incontinence for three weeks. After five weeks, appetite and strength returned; passages easy and painless.—Tison, *loc. cit.*

12. GOSSELIN.—Syphilitic. Forced dilatation three years before. General condition very bad from excesses of all kinds; passages very frequent and painful. Thermo-cautery followed by temporary relief. Four months later, condition same as before with signs of commencing phthisis.—Tison, *loc. cit.*

13. TILLAUX.—Valvular stricture, posterior, with ulceration; anterior portion healthy; several fistulæ. Galvano-cautery. Three years later, complete cure and no return.—Tison, *loc. cit.*

14. TILLAUX.—Old stricture, probably syphilitic, with general cachexia—so great as to resemble that of cancer. *Écraseur*. Four years later, remained completely cured.—Tison, *loc. cit.*

15. TILLAUX.—Probably syphilitic; previous rupture of perinæum;



enormous dilatation of anus; incontinence of fluid fæces; general condition exceedingly bad; signs of occlusion. Operation undertaken without hope of cure, but to relieve symptoms. Galvano-cautery from without inward, with cautery knife. Life prolonged five months, with freedom from suffering.

16. VERNEUIL.—Dysenteric contraction high up, twelve centimetres from anus. Under mistaken diagnosis of spasmodic stricture of sphincter, that muscle was divided with cautery. Entire relief from pain, but continued symptoms of retention.—Tison, *loc. cit.*

17. LABBÉ.—Probably syphilitic; much pain; abscesses; fistulæ. Division with galvano-cautery, followed by considerable hæmorrhage, and tampon. After a time, slight return of contraction at margin of anus, the rest of gut remaining supple. Second operation by Verneuil with thermo-cautery followed in course of six months by prolapse of rectum, which was cured by cauterization of the posterior edge of the anus. Considerable amelioration of suffering.—Tison, *loc. cit.* [quoted from Cerou, "Thèse de Paris"].

18. VERNEUIL.—Syphiloma of long standing; great anæmia; intolerable pain; constant purulent discharge; previous dilatation unsuccessful. Écraseur, followed by dilatation. Four years later, absolute cure. No induration; sphincter acting well.—Tison, "Thèse de Paris."

19. FOCHIER.—Stricture of many years' standing. Patient feeble and emaciated; great gastro-intestinal derangement, and two fistulæ. The constriction was first divided with a bistouri caché to admit the finger, and operation completed with the écraseur. Control of sphincter after the first few days. Left hospital ten days after operation, with appetite and digestion good and general health much improved, having soft passages of the size of the finger.—"Lyon Méd.," Feb. 20, 1876.

#### CANCERS.

1. VERNEUIL.—Cancer. Écraseur, followed by immediate relief; decrease in induration; recovery of appetite and strength. Death from subsequent operation of excision.—"Gaz. des Hôp.," 1872.

2. VERNEUIL.—Cancer reaching beyond point of finger; sphincter continually in contraction, and violent pain caused by slightest touch; attempts at dilatation followed by phlegmon and fistula; constant pain and tenesmus, with bloody passages; insomnia; rapidly approaching fatal termination. The operation consisted merely in dividing the sphincter with écraseur without touching the cancer, and the relief was so great that the patient left hospital believing himself cured.—"Gaz. des Hôp.," Nov., 1872.

3. VERNEUIL.—Cancer, with all the usual symptoms, and approaching occlusion. Écraseur; death on ninth day from peritonitis.—"Gaz. des Hôp.," Nov., 1872.

4. VERNEUIL.—Cancerous stricture high up, and very close; constant suffering from discharges of gas and pus. Écraseur passed as high as pos-



sible, but not high enough to divide upper portion. Considerable relief; cessation of pain; passages easy for several months. Death finally from progress of disease.—“Gaz. Hebdom.,” Mar. 27, 1874, p. 196.

5. VERNEUIL.—Epithelioma involving right half of rectum and reaching too high for extirpation; ulceration; loss of flesh and strength; great pain on defecation; retention. Sphincter divided with chain on left side in such a way as not to involve the cancer. One year later, freedom from pain; general state good; incontinence following operation disappeared; difficulty in passage of solids overcome by seltzer; gradual advancement of cachexia.—“Gaz. Hebdom.,” Mar. 27, 1874, p. 196.

6. VERNEUIL.—Cancer high up, involving prostate and vesiculæ seminales. Continued diarrhoea and incontinence, and bad general condition. A double posterior external operation was done with the chain, and the portion included between the two incisions cut away, with the idea of relieving pain and retention and opening a passage for the subsequent application of escharotics to the cancer. Operation followed by immediate relief of worst symptoms.—“Gaz. Hebdom.,” Mar. 27, 1874.

7. NÉLATON.—Operation done with bistoury. Relief continued till death, eighteen months after, from extension of malignant disease to the pelvis.—Panas, “Gaz. des Hôp.,” 1872, p. 1149.

8. FOCHIER.—Cancer of posterior part of rectum, reaching to height of ten centimetres. Great pain and tenesmus; fetid and bloody discharge; loss of sleep. Complete division with éraseur. Left hospital ten days after, believing himself cured. After two months, had no more pain and no incontinence, except when suffering with diarrhoea. Had two regular passages daily, and complained only of not regaining his strength. In this case the section extended to the unusual height of twelve centimetres from the anus.—“Lyon Méd.,” Feb. 20, 1876.

Regarding the operation of internal rectotomy, there is not very much to be said. There are as yet hardly sufficient published cases for us to judge what chances of radical cure it really offers, but it involves no new principle of treatment, and would seem to rank rather with the older procedures, such as nicking and dilatation, than as a substitute for colotomy. There have been many unpublished cases, especially in New York, and I should probably express the general feeling of the profession, were I to say that it is not looked upon with very great favor; there generally being only temporary relief, with a decided tendency to recontraction. Though at first sight it might appear less serious than the external operation, it is probably the more dangerous of the two—the sphincter preventing the free discharge from the wound and

increasing in this way the liability to pelvic inflammation. This muscle should at least be stretched as a primary step in the operation, and when possible a large drainage-tube should be left in. The danger of hæmorrhage is not very great when the incision is confined to the median line, but, should there be trouble from this cause, the advantage of a free external wound in controlling it will at once be manifest. When the cut is anterior as well as posterior, the anatomical relations must be borne in mind, lest the peritonæum in the female, or the bladder in the male, be wounded. Finally, there is a long course of painful subsequent dilatation still before the patient, to preserve the caliber which the incision gives, and this in itself is the most serious of the practical objections.

Coming, then, to the external operation, we have a table of twenty-seven cases, eight malignant and nineteen non-malignant. All were cases in which lumbar colotomy would have been appropriate, being of long standing; some complicated with numerous fistulæ, and having resisted previous treatment by dilatation or internal incision. Of these, three were divided with the knife, and the others with the *écraseur* or cautery. Only one was fatal as a direct result of the operation, and that one on the ninth day, from peritonitis. One patient died of pneumonia and facial erysipelas three weeks after the operation, but with no local accident to the rectum. In one only was there no permanent benefit from the operation, the condition after four months being much the same as before. In the remaining eighteen of the non-malignant cases, all the patients were greatly relieved as to general health, or local condition, or both. In eight kept under observation for a period of from three months in one case to four years in three cases, the cure is said to have been absolute, there being no return of the contraction, and in some a disappearance of all induration. A tendency to recontraction is mentioned in four, due in two to the fact that all of the stricture was not divided. In the seven cases in which special mention is made of this symptom, the incontinence resulting from division of the sphincter is said to have lasted from a few days to three months. Of the malignant cases, all the



patients except the one who died are reported as greatly relieved of their sufferings; and life was prolonged in comfort till the final death of the patient from the natural course of the disease. One is reported as still comfortable one year after operation, and another died eighteen months afterward.

It will be seen at once that nothing less is claimed for this operation than that it is a substitute for lumbar colotomy in all those grave cases of stricture for which that operation is now done, and which are near enough to the anus to allow of the performance of the former without implicating the peritonæum. The cases quoted above are not very numerous, it is true, but, as far as they go, colotomy can show nothing better either in the way of relieving pain or prolonging life; and, if the results of the minor operation are anything like as good as those of the other, its many advantages do not need to be enumerated.

One point which is exceedingly well brought out in the study of these cases is the important part played by the sphincter muscle in the sufferings accompanying stricture, and the relief given by its simple division without interference with the stricture itself. The relief of pain is perhaps as often an indication for colotomy as is threatened obstruction, and, should it be proved by results that this indication may be met by the complete division of the sphincter, the field of the major operation is again narrowed. In the list of cases there are several which point very decidedly to this conclusion: case 16, of Verneuil's, for example, where, under a mistaken diagnosis, the muscle alone was divided, while the stricture higher up remained unrelieved, and yet there was entire relief from suffering, the patient having to contend only with the mechanical obstruction to the passage of fæces; also, case 2 among the cancers, where again the contraction was high up and the division of the muscle was done, this time deliberately, with fully as much relief as could have been gained by colotomy—so great, in fact, that the patient believed himself fully cured, though all the physical signs due to the retention remained unrelieved; again, case 5 of the cancers, in which the disease was on the right side, and the muscle was divided on the left, and in which life was prolonged for more than a year with



comfort, the mechanical obstruction being relieved by mild aperients.

The question at once arises, how many patients have submitted to all the dangers and discomforts of an artificial anus in the loin or abdomen, not so much for obstruction as for a sphincter muscle constantly in a state of irritation, which might have been relieved by its simple and complete division?

#### BIBLIOGRAPHY.

VERNEUIL.—Des rétrécissements de la partie inférieure du rectum, et de leur traitement curatif ou palliatif par la rectotomie linéaire, ou section longitudinale de l'intestin à l'aide de l'écraseur.—“Gaz. des Hôp.,” October 26, 29; November 7, 9, 12, 16, 19, 1872.

VERNEUIL.—Traitement palliatif du cancer du rectum au moyen de la rectotomie linéaire.—“Gaz. Hebdom.,” March 27, 1874.

PANAS.—Du traitement des rétrécissements du rectum par la rectotomie externe.—“Gaz. des Hôp.,” December, 1872, p. 1148.

MURON, A.—Des rétrécissements de l'extrémité inférieure du rectum, et de leur guérison par la rectotomie linéaire.—“Gaz. Méd. de Paris,” January 4, 1873.

FOCHIER, A.—Sur l'application de la rectotomie linéaire aux rétrécissements très-étendus du rectum.—“Lyon Médicale,” February 20, 1876.

PINGUET.—Des rétrécissements du rectum; appréciation des diverses méthodes thérapeutiques.—“Thèse de Paris,” 1873, No. 17.

TISON.—Nouvelles considérations sur la rectotomie linéaire.—“Thèse de Paris,” 1877.

TURGIS.—Foreign body in rectum.—“Bull. de la Soc. de Chir.,” tome iv., No. 10, 1878, p. 789.

CEROU.—“Thèse de Paris,” 1875, No. 390.

WHITEHEAD, W. R.—Case of fibrous stricture of the rectum relieved by incisions and elastic pressure; with remarks.—“Amer. Jour. Med. Sc.,” January, 1871.

WHITTLE, G.—Stricture of the rectum divided by the knife.—“Lancet,” June 1, 1878, p. 788.

LENTE, F. D.—Report of a case of non-malignant stricture of the rectum, and remarks on the surgical treatment of this disease.—“Amer. Jour. Med. Sc.,” July, 1873.

BEANE, F. D.—Case of specific stricture of the rectum; antero-posterior linear rectotomy; recovery; remarks on the operation.—“Amer. Jour. Med. Sc.,” April, 1878.

Discussion sur les rétrécissements du rectum.—“Bull. de la Soc. de Chir.,” Paris, 1873, p. 83.

# HEALTH,

AND

## HOW TO PROMOTE IT.

BY  
RICHARD McSHERRY, M. D.,

PROFESSOR OF PRINCIPLES AND PRACTICE OF MEDICINE, UNIVERSITY OF MARYLAND; MEMBER OF  
AMERICAN MEDICAL ASSOCIATION; PRESIDENT OF BALTIMORE ACADEMY OF MEDICINE.

---

"L'aisance et les bonnes mœurs sont les meilleurs auxiliaires de l'hygiène."—BOUCHARDAT,

---

*Extract from Preface.*

"Hygiene, public and private, has become, of late years, one of the most important elements of modern civilization. It is a subject in which all mankind has an interest, even if it be, as it too often is, an unconscious interest.

"The present work is addressed to the general reader, no matter what his pursuit, and the language is such as any physician may use in conversation with an intelligent patient; it is therefore as free as such a work can be made from scientific technicalities. It is intended to be rather suggestive than didactic, dealing rather in principles than in minute details; for the last must always be modified by existing conditions, which will vary more or less with every individual, or in every household.

"It is offered as a contribution to a great cause, and the writer trusts that it will have some influence in promoting the health, happiness, and welfare of all who may honor it with a careful perusal. The principles advocated have been, to a great extent, put in practice in the personal experience of the writer in various parts of the world, and under many vicissitudes, and he has found them to be not vague theories, but practical truths of the greatest importance."

---

### CONTENTS.

#### PART I.—INTRODUCTORY REMARKS.

Hygiene the Better Part of Medicine.—The Four Divisions of Human Life: The First Quarter, or the First Score of Years. The Young Man; the Young Woman. The Man; the Woman. The Declining or Old Man.

#### PART II.—HYGIENICS IN SOME DETAIL.

Race, Temperaments, and Idiosyncrasies.—Inheritance.—Habit.—Constitution.—The Air we breathe.—Sewers and Cesspools.—Ozone.—Malaria.—Animal Emanations.—Devitalized House-Air.—Water.—Clothing.—Exercise or Work.—Influence of Occupation upon Longevity.—Limit to Labor.—The Food of Man.—Accessory Food.—Manner of Eating.—Tea and Coffee.—Alcohol.—Use and Abuse.—Ardent Spirits.—Wines.—Malt-Liquors.—Tobacco.—Chewing and Smoking should be forbidden in School.—Report of Naval Surgeons.

---

*One volume, 12mo. Cloth. 185 pages. Price, \$1.25.*

For sale by all booksellers, or will be forwarded by mail, post-paid, on receipt of price

D. APPLETON & CO, Publishers,

NEW YORK.



D. APPLETON & CO.'S

# RECENT PUBLICATIONS

— IN —

## SCIENCE AND MEDICINE.

**THE CHEMISTRY OF COMMON LIFE.** By the late Professor JAMES F. W. JOHNSTON. A New Edition, revised, enlarged, and brought down to the Present Time, by ARTHUR HERBERT CHURCH, M. A., Oxon., author of "Food: Its Sources, Constituents, and Uses." Illustrated with Maps and numerous Engravings on Wood. In one volume, 12mo. 592 pages. Cloth, \$2.00.

**THE PATHOLOGY OF MIND.** BEING THE THIRD EDITION OF THE SECOND PART OF "THE PHYSIOLOGY AND PATHOLOGY OF MIND," RECAST, ENLARGED, AND REWRITTEN. By HENRY MAUDSLEY, M. D., author of "Body and Mind," "Physiology of the Mind," etc. 1 vol., 12mo. Cloth. 580 pages. \$2.00.

**ERASMUS DARWIN.** By ERNST KRAUSE. Translated from the German by W. S. Dallas. With a Preliminary Notice by Charles Darwin. With Portrait and Woodcuts. 1 vol., 12mo. Cloth, \$1.25.

**THE EVOLUTION OF MAN.** A POPULAR EXPOSITION OF THE PRINCIPAL POINTS OF HUMAN ONTOGENY AND PHYLOGENY. From the German of ERNST HAECKEL, Professor in the University of Jena. With numerous Illustrations. In 2 vols., 12mo. Cloth, \$5.00.

**MODERN CHROMATICS,** with APPLICATIONS TO ART AND INDUSTRY. With 18 Original Illustrations, and Frontispiece in Colors. By OGDEN N. ROOD, Professor of Physics in Columbia College. 12mo. Cloth, \$2.00.

**THE HUMAN SPECIES.** By A. DE QUATREFAGES, Professor of Anthropology in the Museum of Natural History, Paris. 12mo. Cloth, \$2.00.

**THE DATA OF ETHICS.** BEING THE FIRST PART OF THE "PRINCIPLES OF MORALITY." By HERBERT SPENCER. 12mo. Cloth, \$1.50.

**SOLAR LIGHT AND HEAT: THE SOURCE AND THE SUPPLY.** Gravitation: with Explanations of Planetary and Molecular Forces. By ZACH. ALLEN, LL. D. With Illustrations. 8vo. Cloth, \$1.50.

**MANUAL OF POWER, FOR MACHINES, SHAFTS, and BELTS.** With a History of Cotton Manufacture in the United States. By SAMUEL WEBBER, C. E. 8vo. Cloth, \$3.50.

**THE SPEAKING TELEPHONE, ELECTRIC LIGHT, AND OTHER RECENT ELECTRICAL INVENTIONS.** By GEORGE S. PRESCOTT. New edition, with 200 additional pages, including illustrated descriptions of all of Edison's inventions. 214 Illustrations. 8vo. Cloth, \$4.00.

**A GLOSSARY OF BIOLOGICAL, ANATOMICAL, AND PHYSIOLOGICAL TERMS.** By THOMAS DUNMAN. Small 8vo. Cloth, \$1.00.

**THE MOON: HER MOTIONS, ASPECT, SCENERY, and PHYSICAL CONDITIONS,** with TWO LUNAR PHOTOGRAPHS and many ILLUSTRATIONS. By RICHARD A. PROCTOR. New edition. 12mo. Cloth, \$3.50.

**A TREATISE ON CHEMISTRY.** By H. E. ROSCOE, F.R.S., and C. SCHORLEMMER, F.R.S., Professors of Chemistry in Owens College, Manchester, England. Vol. II. Part I.—METALS. With numerous Illustrations. 1 vol., 8vo. Cloth, \$3.00.

**THE STUDY OF ROCKS.** AN ELEMENTARY TEXT-BOOK IN PETROLOGY. With Illustrations. By FRANK RUTLEY, of the English Geological Survey. 16mo. Cloth, \$1.75.

**COOLEY'S CYCLOPEDIA OF PRACTICAL RECEIPTS,** and COLLATERAL INFORMATION IN THE ARTS, MANUFACTURES, PROFESSIONS, and TRADES, including MEDICINE, PHARMACY, and DOMESTIC ECONOMY. Sixth edition. Revised and partly rewritten by RICHARD V. TIGSON, Professor of Chemistry and Toxicology in the Royal Veterinary College. In two volumes. Vol. I. 8vo. Cloth, \$4.50.

**THE FAIRY-LAND OF SCIENCE.** By ARABELLA B. BUCKLEY, author of "A Short History of Natural Science," etc. With numerous Illustrations. 12mo. Cloth, \$1.50.

**FREEDOM IN SCIENCE AND TEACHING.** From the German of ERNST HAECKEL. With a Prefatory Note by T. H. HUXLEY, F.R.S. 12mo. Cloth, \$1.00.

**OCEAN WONDERS. A COMPANION FOR THE SEASIDE.** By WILLIAM E. DAMON. With numerous Illustrations. 12mo. Cloth, \$1.50.

**MATERIA MEDICA AND THERAPEUTICS.** By ROBERTS BATHOLLOW, M.D. Third edition, revised and enlarged. 8vo. Cloth, \$5 00; sheep, \$6 00.

**FIRST LINES OF THERAPEUTICS.** By ALEXANDER HARVEY, M.D. Professor of Materia Medica in the University of Aberdeen. 12mo. Cloth, \$1.50.

**ANALYSIS OF THE URINE, WITH SPECIAL REFERENCE TO THE DISEASES OF THE GENITO-URINARY ORGANS.** By K. B. HOFMANN, Professor in the University of Graz, and R. ULTMANN, Docent in the University of Vienna. Translated by T. BARTON BRUNS, A.M., M.D., and H. HOLBROOK CURTIS, Ph.B. With Eight Colored Plates. 8vo. Cloth, \$2 00.

**BILLROTH'S GENERAL SURGICAL PATHOLOGY AND THERAPEUTICS,** in Fifty-one Lectures: A Text-Book for Students and Physicians. A revised and enlarged edition. 1 vol., royal 8vo, 775 pages. Cloth, \$5.00; sheep, \$6.00.